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ABSTRACT

The purpose of this study was to (1) ascertain the perceptions of teachers using volunteer aides and (2) to investigate the effect of the use of volunteer aides on student achievement when comparing anticipated achievement with actual academic achievement. The population included elementary school teachers and 169 student from 2 elementary schools in Arizona's Sahuarita Unified School District No. 30. Teachers were given an opinion questionnaire constructed to indicate teacher effectiveness as a result of using volunteer aides. The mean scores of teacher responses were graphically illustrated on a profile chart. Classrooms of students were selected, one from each grade level, 2 to 5, and were administered the Short Form Test of Academic Aptitude and the California Achievement Test. From the data collected, linear regressions utilizing residuals were graphically constructed for each class of students in the control and experimental groups. Significant levels of student achievement were noted based on analysis of variance of potential vs. performance. Aptitude, sex, and ethnic background did not significantly affect the outcome of any findings. Volunteer aides did enhance teacher effectiveness and increased student achievement in the areas of reading and grammar on all grade levels irrespective of aptitude, sex, and ethnicity. (Author/PN)

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UTILIZING REGRESSION METHODOLOGY TO INVESTIGATE THE EFFECTS OF VOLUNTEER AIDES ON STUDENT ACHIEVEMENT

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ABSTRACT

The purpose of this study was to (1) ascertain the perceptions of teachers using volunteer aides and (2) to investigate the effect use of volunteer aides have on student achievement when comparing anticipated achievement with actual academic achievement.

The population for this study included the teachers at Elementary School A and students from both Elementary School A and Elementary School B in the Sahuarita Unified School District No. 30 system at Sahuarita, Arizona.

From these groups, all teachers at Elementary School A were used in the sample study and one class from each grade level, two to five, from each school was selected to be representative of the total grade level.

Faculty members from Elementary School A were given an opinion questionnaire constructed to indicate teacher effectiveness as a result of using volunteer aides. The teachers from Elementary School B were not given the opinion questionnaire because they did not utilize the services of volunteer aides.

The Volunteer Aide Teacher Opinion Questionnaire was validated by using Aiken's Index of Content Validity and the information gathered on it was analyzed by a simple tally method. The mean scores of teacher responses were graphically illustrated on a profile chart.

Classrooms of students were selected, one from each grade level, two to five, and were administered the Short Form Test of Academic Aptitude

and the California Achievement Test at both Elementary School A and at Elementary School B. From the data collected, linear regressions utilizing residuals were graphically constructed for each class of students in the control and experimental groups. Significant levels of student achievement were noted based on analysis of variance of potential vs. performance.

Aptitude, sex, and ethnic background were investigated to determine cause and effect relationships and for future investigative research.

UTILIZING REGRESSION METHODOLOGY TO INVESTIGATE THE EFFECTS OF VOLUNTEER AIDES ON STUDENT ACHIEVEMENT[1]

Introduction

Dr. J. Lloyd Trump (Trump and Baynham 1961, p. 8) states that "one third of the teaching day goes to clerical and sub-professional tasks and another third to work that could just as well be done by various kinds of automatic devices. . . ."

Teachers are hard pressed to meet the daily demands placed on them by the ever increasing number of students placed in their classrooms and by the even greater diversity of individual student needs. Financial constraints have impeded the feasibility of adding professional and para-professional staff members to alleviate this problem.

Over the past decade, a phenomenon has emerged in school districts across the United States to help rectify this serious situation without infringing on an already overburdened budget--the use of volunteer aides to help students learn.

The practice of using volunteer aides in one form or another to assist in the instructional process at all levels of education is not a new or unique practice. Volunteer programs have been utilized by many societies for the purpose of transmission of culture. In the first century, the noted Roman teacher, Quintilian, pointed out in De Institutio Oratoria (A.D. 69) how much the younger children could learn from the older ones.

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1. This paper is based on the first author's dissertation in the Department of Secondary Education, University of Arizona. Special thanks would like to be expressed to members of his doctoral committee: Dr. Paul Allen, Dr. William Barnes, Dr. Donald Clark, Dr. Kenneth Gose, and Dr. Robert Grant.
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In the United States, the emergence of the one-room school promoted considerable peer and cross-age teaching. This was necessary in order for teacher to be able to manage the diverse content and needs of the students (Gartner et al. 1971).

In a similar frame of reference, the concept of parents acting as an integral component in the development and enhancement of educational and vocational training for their children have been commonplace. Fathers training sons and mothers helping daughters has, since the beginning, been a way of existence and livelihood (Hess 1973).

The community is a storehouse of unique people with a lifetime of experiences to share with students. The oldest members of a clan or community in all cultures and societies have been looked to in the societal and cognitive problems (Whaley 1973).

With the advent of the volunteer programs, it was inevitable that researchers would investigate the ramifications such programs have, not only on teacher effectiveness, but even more important, on student achievement.

Significance of the Study

Now, more than ever before, finding alternative ways of making teachers more effective in the classroom, with the end result of student achievement, has become a topic of intense discussion and examination (Trump and Baynham 1961).

The use of peer aides, student aides, parent aides, and community aides not only has a positive effect on the achievement of the students being tutored or given extra help, but, also, has a multidimensional by-product of the peers and students benefiting from the activity (Gartner et al. 1971).

Parents benefit from the fact that they have helped their children, and community aides benefit from realizing they have a role to play in a very essential and vital endeavor (Hess 1973).

Volunteer aides are persons who gave freely of their time in the classroom to assist the teacher in non-initiated instructional tasks or who performed clerical services to enhance teacher effectiveness.

a. Peer aides were children within the classroom or who were at the same grade level who used their higher abilities to help those students of lesser ability.

b. Student aides were those students from higher grade levels who performed clerical tasks and cross-age tutoring activities.

c. Parent aides were parents of children within the school who performed clerical and tutorial duties.

d. Community aides were adult members of the community, most of whom were retired, who performed clerical and non-initiated instructional tasks.

First, the teacher was given more help to develop materials that were of significance to the individual needs of each pupil through clerical, supervisory and non-initiated instructional assistance (Hiatt 1978).

Second, the peer tutors benefit by learning the subject well in order to assist other students. The peer tutors self-confidence and concepts are increased due to the fact that he or she has helped another person to succeed. Most of the literature examined emphasizes that the crux of peer tutorial process lies in helping enhance the child's feeling of self-worth (Johnston 1981).

Third, the student aides, even as the peer aides, benefit from learning the materials well enough to help other students of a younger age. The student aides, also, can assist with clerical tasks and thus formulate some

possible thoughts regarding future goals and careers. Cross-age relationships influence educational aspirations and achievement and attitudes toward school. These relationships contribute to the socialization of values, attitudes and ways of perceiving the world (Johnston 1981).

Fourth, parents not only have an opportunity to help the teacher and their own and other children but can become aware of the different student needs and school needs. Parent aides can become valued assistants within the school and throughout the community.

Finally, the community aides bring to the children, not only another adult to hear, listen and help them, but someone who can help the teacher have more time to give individual attention to those who need it. Community aides bring with them a lifetime of experiences to share. They are quite capable of various clerical tasks and are extremely happy to learn new ideas and methods relating to the educational process. Ultimately, they themselves, are enriched by a feeling of usefulness and meaningfulness (Instructor 1979).

The benefits of volunteer aides effect every segment of the classroom and everyone of these persons who participate (Sager 1974). The ultimate effect, however, was most dramatic and the most meaningful, and that was the increase in teacher effectiveness as evidenced through student achievement as a result of the volunteer program. This was the major research endeavor of this study.

Purpose of the Study

The purpose of the present study was (1) to ascertain the perceptions of teachers using volunteer aides, and (2) to investigate the effects of

the use of volunteer aides on student achievement when comparing anticipated achievement with actual academic achievement.

Methodology

This study was conducted in the Sahuarita Unified School District during the 1981-1982 school year. At that time, the enrollment in grades K-5 of the district was approximately 650. The ethnic composition of the elementary school children was 32 percent Mexican-American and 68 percent Anglo. Both elementary schools were similar in ethnic composition and socioeconomic status as measured by participation in the free lunch program. The majority of students came from homes in which the head of the household was in the blue collar labor force which included such occupations as miners, office managers and clerks. The same curriculum materials had been adopted at both schools and the overall student-teacher ratio was approximately 20 to 1.

Sample

The sample consisted of 169 students (60 Mexican-American and 109 Anglo) randomly selected who were enrolled in grade 2 (n = 44), grade 3 (n = 41), grade 4 (n = 42), and grade 5 (n = 42). Seventy-three were males and 95 were females. A chi-square test ($X^2(1) = .80$) indicated non-significant and provided evidence that the sample was not significantly different from the population with respect to ethnicity.

Instrumentation

California Achievement Test. The California Achievement Test (CAT), Form C (CTB/McGraw-Hill, 1977) was administered to all students in April 1982. Three subtest scores were obtained from the CAT: Reading (Reading Vocabulary and Reading Comprehension), Language (Language Mechanics and Language Expression), and Mathematics (Mathematics Computation, and Mathematics Concepts and Applications).

Short Form Test of Academic Aptitude. The Short Form Test of Academic Aptitude (SFTAA), (Sullivan, Clark, and Tiegs, 1971) was administered to all students at the time of the testing with the CAT. Each level of the SFTAA contains four subtests which measure vocabulary development, logical reasoning, education of quantitative relations, and meaningful memory. According to the authors of the SFTAA (Sullivan, Clark and Tiegs, 1971, p. 7): the SFTAA is "designed to 1) assess the level of intellectual development attained by a student, and 2) predict his potential rate of progress and level of success in school."

Teacher Opinion Questionnaire. The Teacher Opinion Questionnaire was developed by the first author to measure teacher opinions about the usefulness of volunteer aides. The 52 items of the TOP were designed to assess general opinions about aides (12 items), opinions about peer aides (10 items), opinions about student aides (10 items), and community aides (10 items). Responses were recorded on a 5-point rating scale from (1) strongly disagree to (5) strongly agree. The TOP was pilottested in December 1981 and then tested with teachers in their classrooms. The content validity of the TOP was investigated with Aiken's index (V) of content validity (Aiken, 1980). The validity coefficient V was .81 which was judged to be adequate for the instrument.

Independent Variable

The independent variable in this study was participation (Elementary School A) or non-participation (Elementary School B) in the volunteer aide program.

Procedures

Elementary School A received the assistance of volunteer aides for over 3 years. However, the school year 1981-82 marked the highest level of assitance of volunteer aides. It was in April 1982 that students were

tested with the CAT and teh SFTAA. The TOP was administered to 27 teachers in April 1982 to obtain an estimate of teacher opinions of the volunteer aides activities.

Data Analysis

Elementary School A and Elementary School B were compared on the SFTAA at each grade level with t-tests to determine if the academic aptitude of the two schools were significantly different. The results of these tests were that Elementary School A achieved to a significantly higher degree than did Elementary School B in reading and language when predicted achievement was compared to actual achievement. There was no significant difference in mathematics except at the second grade level.

Three bivariate regression equations were computed at each grade level employing the CAT Reading, Language, and Mathematics scores as criterion measures. The SFTAA was employed as the predictor measure in each analysis. From the regression equation, predicted CAT Reading, Language, and Mathematics scores were obtained. Residuals were then calculated. Each student's residual score (actual achievement score minus predicted achievement score) was a measure of the extent to which achievement exceeded or failed to exceed predicted achievement. To determine whether mean residuals for each school were significantly different, a one-way ANOVA (Elementary School A vs. Elementary School B) was calculated on the residuals. This produced three separate ANOVAs at each grade level. The null hypothesis in each case was that there was nc difference in mean residuals of Elementary School A and Elementary School B. This approach may be generalized to factorial ANOVA designs, as well as to designs with more than one predictor variable. For an excellent example of the use of this methodology employing 2 X 2 ANOVAs with several predictor measures, see Reynolds (1980).

This residuals approach is conceptually similar to analysis of covariance (ANCOVA). The main difference is that the residuals method focuses on the extent to which actual achievement exceeds (or not) the predicted achievement level. The ANCOVA approach is to adjust the posttest means for differences in pretest status. Because there are different assumptions and different purposes of the two models, the results are somewhat different.

Summary of the Findings from the Teacher Opinion Questionnaire

Means were calculated for each item on the TOP and presented as teacher profiles (See figure 1). The results for each of the five profiles were as follows:

1. Teachers felt that volunteer aides were of definite benefit and enhanced teacher effectiveness:
   a) that volunteer aides increased student achievement
   b) that volunteer aides were capable of performing clerical, supervisory and non-instructional tasks
   c) that volunteer aides needed no specialized training
2. Teachers felt that the use of peer aides was a sound educational endeavor and of benefit to teacher effectiveness:
   a) that peer aides were capable of performing clerical tasks
   b) that peer aides of greater abilities academically assisted and helped students of lesser abilities
   c) that peer aides reinforced their own abilities through the process of volunteering
   d) that peer aides needed no specialized training to perform various tasks within the classroom

Item	Description	Responses 1 2 3 4 5
1.	Volunteer aides are of value to the teacher.	
2.	Volunteer aides enhance student achievement.	
3.	Volunteer aides give teachers more time to teach.	
4.	Student self esteem and self confidence can be improved by the use of volunteer aides.	
5.	Volunteer aides can only be used to do clerical tasks.	
6.	Volunteer aides need constant supervision by the teacher.	
7.	It takes specialized training to be of assistance in the classroom.	
8.	Teacher effectiveness is enhanced by the use of volunteer aides.	
9.	The ability of the teacher to give individual student help is increased by the use of volunteer aides.	
10.	The time teachers would normally spend on clerical tasks is reduced by the use of volunteer aides.	
11.	A volunteer aide program should be initiated to assist in the educational program.	
12.	Slower students are helped by the use of volunteer aides.	

Figure 1. Profile of teacher opinions regarding the general use of volunteer aides and teacher effectiveness.

3. Teachers indicated that student aides were of valuable assistance in allowing them to teach rather then spend time on non-instructional tasks:

a) that student aides needed no specialized training

b) that student aides benefited from working with younger children

c) that student aides were given direction towards possible future careers through the volunteer program

d) that student aides increased student achievement

4. Teachers were of the opinion that parent aides were an effective support mechanism for them in terms of allowing them to perform their teaching activities:

a) that parent aides were of valuable assistance in performing clerical, non-initiated instructional and supervisory tasks

b) that parent aides needed no specialized training

c) that parent aides helped to enhance the communication between home and school

d) that parent aides increased student self-concepts and esteem

5. Teachers positively responded to the utilization of community volunteer aides in helping them effectively perform their teaching activities:

a) that community aides were of great assistance in performing non-initiated instructional tasks

b) that community aides have a life time of valuable information to bring to the classroom

c) that no specialized training was necessary for community aides

d) that community aides enhanced student achievement

Summary of Findings Related to the Use of Volunteer Aides and Student Achievement

Based on the performance scores as measures of actual achievement and potential scores as measures of predicted achievement, a bivariate regression equation was computed to obtain the optimal prediction equation. The SFTAA score was a predicted score based on sex, age, grade, and aptitude which represented the student's predicted grade equivalent. This predicted grade equivalent was the result of the prediction equation. A residual score was the actual grade equivalent score minus the predicted grade equivalent score. Thus, the residual indicated the degree to which a student achieved above or below the predicted achievement. If the mean of the residuals was negative for a group, it indicated that the average for the group was below that which was predicted and visa versa (Figure 2).

Figure 3 presents a graph of the second grade linear regression using residual were in reading performance (actual achievement) vs. was plotted against potential (predicted achievement). Elementary School A scores were indicated with an X while Elementary School B scores were indicated by a period. The tendency for Elementary School A scores to cluster above the regression line and for Elementary School B scores to cluster below the regression line can be observed. Each student's residual score (actual achievement minus predicted achievement) is the vertical distance from the regression line to the actual achievement score.

Table 1 presents data for the second grade in reading at both Elementary School A and B based on mean residuals, F-ratio and significance of F for achievement, aptitude, sex, and ethnicity.

Similar figures and tables were constructed on each grade level (2-5) for reading, language and mathematics. Table 2 represents the analysis of variance by school on the residuals for reading.

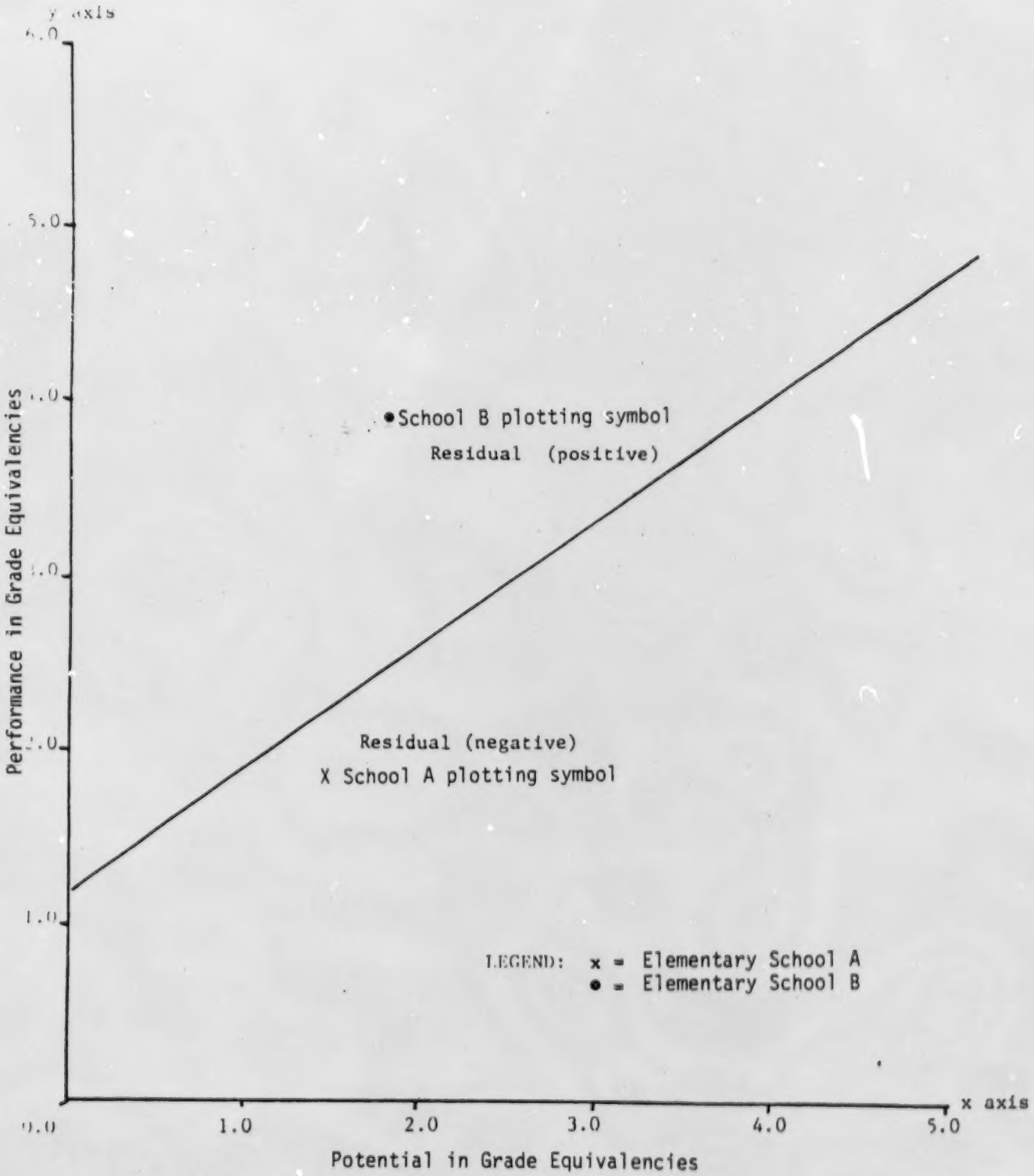

Figure 2. Linear regression using residuals based on Performance vs. Potential.

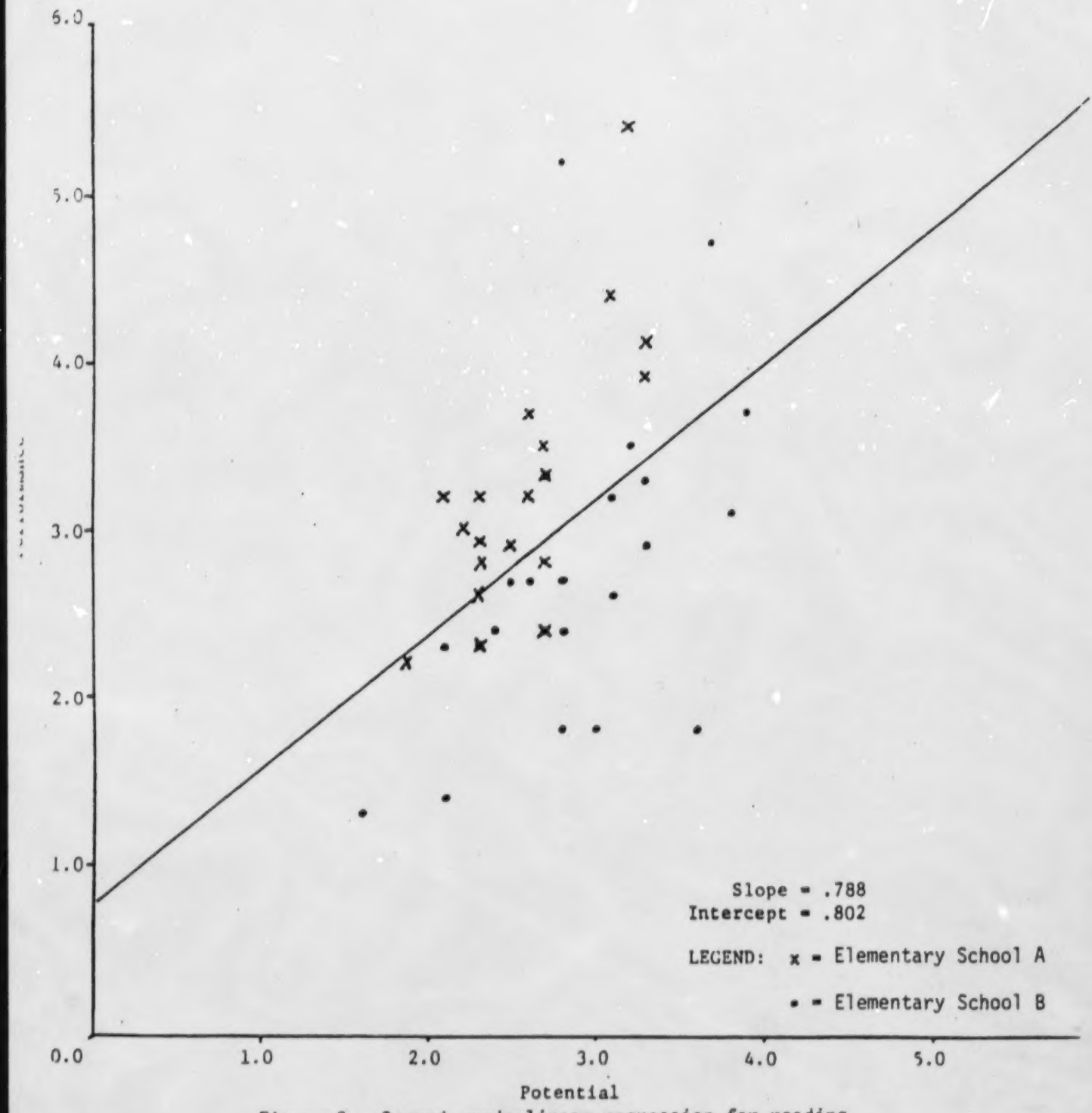

Figure 3. Second grade linear regression for reading.

Table 1. Analysis of variance of the mean residuals by school, I.Q., sex and ethnicity for the second grade in reading.

Variables		N	Mean Residuals	F-Ratio	Significance of F
1.	School	44			
	School A	23	0.42	17.496	.000
	School B	21	-0.38		
2.	Aptitude	44			
	Low	21	0.03	1.475	.232
	High	23	-0.03		
3.	Sex	44			
	Male	19	-0.8	.184	.670
	Female	25	0.6		
4.	Ethnicity	44			
	Hispanic	17	-0.02	.073	.788
	Anglo	27	0.01		

Table 2. Analysis of Variance by school on residuals for reading

Grade	N	Mean Residuals	F-ratio	Significance
Grade 2				
School A	23	.42	17.496	.000
School B	21	-.38		
Grade 3				
School A	22	.30	14.434	.001
School B	19	-.35		
Grade 4				
School A	22	.39	6.415	.016
School B	20	-.43		
Grade 5				
School A	24	.25	3.790	.059
School B	18	-.33		

The data from the figures and tables supported the fact that the students at Elementary School A achieved to a higher degree in reading and language on the second, third, fourth, and fifth grade levels. In mathematics it is just as apparent that no significant deductions were able to be drawn to support advanced achievement based on actual achievement when compared to predicted achievement.

Aptitude, sex, and ethnicity were of no significance. Only minor instances of significance were noted in particular areas that were isolated and that did not effect the overall comparisons and end result of the research.

The following questions were answered as a result of the analysis of variance done on the second, third, fourth, and fifth grades in reading, language, and mathematics at both schools relating to volunteerisms and student achievement:

1. The students at Elementary School A because of the utilization of volunteer sides achieved to a higher degree in reading and based on the positive residual results obtained when the actual achievement and the predicted achievement scores were plotted and analyzed.

2. The students at Elementary School B without the use of volunteer aides achieved to a lesser degree in reading and grammar based on the negative residual results obtained when the actual achievement and the predicted academic scores were plotted and analyzed.

3. The second grade students at Elementary School A with the assistance of volunteer aides achieved to a significantly higher level than the students at Elementary School B in mathematics based on the positive residual results obtained when the actual achievement and the predicted achievement scores were plotted and analyzed.

4. The aptitude did not significantly effect the outcome of any findings based on the use of volunteer aides and student achievement.

5. Sex did not significantly effect the outcome of any findings based on the utilization of volunteer aides and student achievement.

6. Ethnicity did not significantly effect the results of any findings based on the utilization of volunteer aides and student achievement.

7. Volunteer aides enhanced teacher effectiveness and increased student achievement in the areas of reading and grammar on all grade levels irrespective of aptitude, sex, and ethnicity.

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